AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) An echo canceller for use in a transceiver, comprising:

first electronic circuitry configured to estimate in the frequency domain an echo signal, and

second electronic circuitry configured to remove in the frequency domain the estimated echo signal in the frequency domain from a received signal in the frequency domain,

wherein the first electronic circuitry is further configured to estimate the echo signals in the frequency domain using a combination of (i) a product of a first matrix of coefficients in the frequency domain and a transmitted symbol and (ii) a product of a second matrix of coefficients in the frequency domain and a previously-transmitted symbol.

2. (Cancelled).

3. (Previously Presented) The echo canceller in claim 1, wherein transmitted signals corresponding to the transmitted symbol and the previously-transmitted symbol are real-valued, and wherein the transmitted symbol and the previously-transmitted symbol are divided into real and imaginary parts before being combined with the respective matrix to reduce computational complexity.

4. (Previously Presented) The echo canceller in claim 1, wherein the coefficients of the first matrix represent how an echo from a currently transmitted frequency domain signal affects a received signal.

5. (Original) The echo canceller in claim 4, wherein the coefficients of the second matrix represent how an echo from a previously transmitted frequency domain signal affects the received signal.

6. (Previously Presented) The echo canceller in claim 1, wherein the first electronic circuitry is further configured to adapt the coefficients of the first matrix and the second matrix using a difference between the received signal and the estimated echo signal.

7. (Previously Presented) The echo canceller in claim 6, wherein the first electronic circuitry is further configured to adapt the coefficients using a least mean squares algorithm.

8. (Cancelled).

9. (Original) The echo canceller in claim 1, wherein the transceiver is a discrete multitone (DMT) transceiver.

10. (Currently Amended) The echo canceller in claim ~~2~~ 1, wherein the first and second matrices are N x N matrices, where N is a number of symbol samples.

11. (Original) The echo canceller in claim 1, wherein a vector corresponding to a transmitted frequency domain symbol, a vector corresponding to a received frequency domain signal, and a vector corresponding to an estimate of the echo symbol are all Hermitian symmetric.

12. (Previously Presented) The echo canceller for use in a transceiver, comprising:

first electronic circuitry configured to estimate in the frequency domain an echo signal, and

second electronic circuitry configured to remove in the frequency domain the estimated echo signal in the frequency domain from a received signal in the frequency domain,

wherein the first electronic circuitry is further configured to estimate the echo signals in the frequency domain using a combination of a product of (i) a vector of coefficients in the frequency domain and a transmitted symbol and (ii) a product of a matrix of coefficients in the frequency domain and a compensated, previously-transmitted symbol .

13. (Previously Presented) The echo canceller in claim 12, wherein the first electronic circuitry is further configured to divide the transmitted symbol and the previously-transmitted symbol into real and imaginary parts before combining them respectively with the vector and the matrix to reduce computational complexity.

14. (Original) The echo canceller in claim 12, wherein a compensation factor used to compensate the previously-transmitted signal is a complex exponential term.

15. (Original) The echo canceller in claim 14, wherein the transceiver is a discrete multitone (DMT) transceiver and the compensation factor compensates for a cyclic prefix associated with the previously-transmitted signal.

16. (Original) The echo canceller in claim 1, wherein when a transmitter of the transceiver has a lower sampling rate than a receiver of the transceiver, the echo signal is interpolated at the receiver.

17. (Original) The echo canceller in claim 1, wherein when a transmitter of the transceiver has a higher sampling rate than a receiver of the transceiver, the echo signal is decimated at the receiver.

18. (Previously Presented) An echo canceller for use in an asynchronous transceiver configured to cancel an echo signal, comprising:

a first matrix of coefficients;

a second matrix of coefficients; and

electronic circuitry configured to use a combination of (i) a product of the first matrix and a currently-transmitted symbol and (ii) a product of the second matrix and a previously-transmitted symbol to estimate an echo signal in the frequency domain, to transform the estimate of the echo signal into the time domain, and to remove the transformed estimate from a received signal in the time domain.

19. (Previously Presented) An echo canceller for use in an asynchronous transceiver configured to cancel an echo signal, comprising:

a vector of coefficients in the frequency domain;

a matrix of coefficients in the frequency domain,

electronic circuitry configured to use a combination of (i) a product of the vector and a currently-transmitted symbol and (ii) a product of the matrix and a compensated, previously-transmitted symbol to estimate an echo signal in the frequency domain, to transform the estimated echo signal into the time domain, and to remove from a received signal in the time domain.

20. (Previously Presented) An echo canceller for use in a transceiver canceling an echo from a received signal in the frequency domain including circuitry configured to determine an estimate of the echo in the received signal using a frequency domain model of an echo path channel that takes into account effects of inter-carrier interference and to subtract the echo estimate from the received signal.

21. (Previously Presented) The echo canceller in claim 20, wherein the echo canceller is used in a discrete multitone (DMT) type transceiver and the frequency domain model takes into account intersymbol interference .

22. (Original) The echo canceller in claim 20, wherein the frequency domain model includes a first set of values that models how an echo from a currently transmitted frequency domain symbol distorts the received signal and a second set of values that models how an echo from a previously transmitted frequency domain symbol distorts the received signal.

23. (Original) The echo canceller in claim 22, wherein the first set of values is a first complex matrix and the second set of values is a second complex matrix.

24. (Original) The echo canceller in claim 22, wherein the first set of values is a column vector and the second set of values is a matrix.

25. (Original) The echo canceller in claim 24, wherein the matrix is combined with a difference between the currently transmitted symbol and a product of the previously transmitted symbol and a compensating factor.

26. (Original) The echo canceller in claim 22, wherein the transmitted symbol and the previously transmitted symbol are divided into real and imaginary parts before being combined with the first and second sets of values, respectively.

27. (Original) The echo canceller in claim 20, wherein when a transmitter of the transceiver has a lower sampling rate than a receiver of the transceiver, the echo signal is interpolated at the receiver.

28. (Original) The echo canceller in claim 20, wherein when a transmitter of the transceiver has a higher sampling rate than a receiver of the transceiver, the echo signal is decimated at the receiver.

29. (Cancelled).

30. (Previously Presented) A frequency domain echo canceller for use in a transceiver canceling an echo from a received signal in the frequency domain including circuitry configured

to determine an estimate of the echo in the received signal using a frequency domain model of an echo path channel that includes effects of intersymbol interference and inter-carrier interference and to subtract the echo estimate from the received signal to provide a difference.

31. (Original) The echo canceller in claim 30, wherein the frequency domain model includes a first set of values that models completely in the frequency domain how an echo from a currently transmitted frequency domain symbol distorts the received signal and a second set of values that models completely in the frequency domain how an echo from a previously transmitted frequency domain symbol distorts the received signal.

32. (Original) The echo canceller in claim 31, wherein transmitted signals corresponding to the currently and previously transmitted frequency domain symbols are real-valued.

33. (Original) The echo canceller in claim 32, wherein the currently transmitted symbol, the previously transmitted symbol, the received signal, and the difference are vectors having Hermitian symmetry.

34. (Original) The echo canceller in claim 31, wherein the difference is used to adjust the first and second set of values.

35. (Previously Presented) A method for reducing an echo at a transceiver comprising:

(a) combining in the frequency domain a currently-transmitted symbol with a first vector or matrix of coefficients in the frequency domain resulting in a first combination;

(b) combining in the frequency domain a previously-transmitted symbol with a second matrix of coefficients in the frequency domain resulting in a second combination;

(c) combining the first and second combinations in the frequency domain to estimate the echo in the frequency domain; and

(d) using the estimated echo to reduce the echo in a signal received at the transceiver.

36. (Original) The method in claim 35, further comprising:

determining a difference between the received signal and the estimated echo, and

adjusting the first and second set of values using the difference.

37. (Previously Presented) The method in claim 35, wherein the first vector or matrix corresponds to a first matrix of coefficients .

38. (Previously Presented) The method in claim 35, wherein the first vector or matrix corresponds to a column vector of coefficients .

39. (Original) The method in claim 38, wherein the combining step (b) includes:

multiplying the previously transmitted symbol by a compensation factor to produce a product;

subtracting the product from the currently transmitted symbol; and

combining a result of the subtracting with the matrix.

40. (Original) The method in claim 35, wherein when a transmitter of the transceiver has a lower sampling rate than a receiver of the transceiver, the method further comprising:

interpolating the echo signal.

41. (Original) The method in claim 35, wherein when a transmitter of the transceiver has a higher sampling rate than a receiver of the transceiver, the method further comprising:

decimating the echo signal.

42. (Original) The method in claim 35, wherein a vector corresponding to a transmitted frequency domain symbol, a vector corresponding to a received frequency domain signal, a vector corresponding to an estimate of the echo symbol are Hermitian symmetric.

43. (Original) The method in claim 35, further comprising:

dividing the currently transmitted symbol and the previously-transmitted symbol into real and imaginary parts before the combining steps (a) and (b), respectively, to reduce computational complexity.

44. (Currently Amended) The method according to claim 35, wherein the transceiver is an asynchronous transceiver, the method further comprising:

transforming the estimated echo into the time domain, and

removing in the time domain, the estimated echo signal from the received signal on a sample-by-sample basis.